JKDEFRAG FREQUENTLY ASKED QUESTIONS

What is "disk fragmentation"?
Imagine a book split into several parts, some pages are over here, other pages in another room on another floor altogether. You will have to walk a lot when you need to read the book. It may sound silly, but this is exactly what happens to files on your harddisk. Defragmentation will put all the parts (fragments) back together, making your computer a lot faster.

What is "disk optimization"?
Imagine a big library with lot's of books, spread out all over the building and not sorted whatsoever. There is an index telling you exactly where every book is, but you will have to walk a lot when you need several books. This is exactly what happens on your harddisk, the files that belong to an application can be all over the place, anywhere on the harddisk. Optimization will bring all the files together in one place, leaving the rest of the harddisk empty, and will sort the files, for example alphabetically.

How safe is it?
JkDefrag is based on the standard defragmentation API by Microsoft, a system library that is included in Windows 2000, 2003, XP, Vista, and 2008. Most defragmenters are based on this API, including commercial defragmenters. Basically all JkDefrag does is send "move this file to that location" commands to the API. It does not touch the disk by itself, and is therefore extremely solid. If your disks use NTFS then you're even safe when the computer crashes in the middle of defragmenting. Nevertheless, it's still a good idea to backup before defragmenting, just like with other defragmenters, because the heavy use of the harddisk may trigger a hardware fault (disk crash), and/or overheating (disk, power supply, controller chipset, etc.).

Do I have to "checkdisk" before running JkDefrag?
Feel free to do so, but it's not necessary. JkDefrag is totally solid and cannot get confused by a corrupted disk. And even if it could then nothing bad can happen, because JkDefrag does not write to disk itself. Everything is done through the Windows defragmentation API, and Windows is quite smart about handling corrupted disks.

How do I specify an option, or select a single disk (or folder or file)?
If you don't know how to use the Windows commandline, then take a look at the GUI wrappers, see the "Contributed by other people" chapter. Another way is to create a shortcut to "JkDefrag.exe", open the properties of the shortcut, and add the desired commandline options (for example "-a 7") or the name(s) of the disk/folder/file (for example "C:") to the end of the "target" line. For example:

```
"C:\JkDefrag\JkDefrag.exe" -a 7
"C:\JkDefrag\JkDefrag.exe" D:
```

Tip: In the same properties window you can select "minimized".

Tip: See the JkDefrag "-q" option to exit automatically when finished.

Where is the Stop button?
All versions of JkDefrag can be stopped safely at any time, there is no risk of losing data or corrupting your disk. You can use all the usual ways to stop a Windows program, such as pressing ALT-F4, clicking the 'x' in the top-right corner, via the pull-down menu in the taskbar, or by killing the program via the task manager or another utility. The commandline program can be stopped the same way, plus by pressing CTRL-C, or BREAK. It may take a bit of time for the program to actually stop, JkDefrag will finish the current file in the background.

What are the colors on the diskmap?

See the list in the "Install" chapter, just above the snapshot.

Note: Unmovable files are only colored in red after JkDefrag has unsuccesfully tried to move them.

Does JkDefrag support RAID Disks, USB disks, floppies, memory sticks?
Yes, no problem whatsoever. JkDefrag does not know anything about the underlying hardware, it leaves that up to Windows. It can therefore defragment and optimize anything and everything that behaves like a disk.

Note: Removable media (for example floppies) are not processed by default, only when you specify the disk on the commandline (for example "jkdefrag G:").

Are striped RAID volumes faster at the beginning?
Yes. Striped raid volumes are mapped onto physical drives in blocks (usually 64 kilobyte). The first block in the stripe set is the first block on the first drive, the second striped block is the first block on the second drive. If there are only 2 drives then the third striped block is the second block on the first drive. So, striped raid volumes have the same characteristics as the underlying physical drives - fast at the beginning and slow at the end. You can test the speed with the HDTune utility, see the link in the "see also" chapter.

What is the best defragmentation/optimization strategy for me?
My advice for all computers is to run JkDefrag once with the "-a 7" optimization (sort by name), and from then on automatically every day with the default "-a 3" fast-optimize option.
Note: The "-a 9" optimization (sort by last access time) only works as expected if you do not use programs that scan all files on disk (such as virus scanners and backup programs), causing Windows to update all the last access times.

How can I run JkDefrag automatically every day?
It's a great idea to run JkDefrag automatically every day by adding it to the Windows scheduler, like this:

- Start -> Control Panel -> Scheduled Tasks -> Add Scheduled Task
- The wizard starts, click 'Next'.
- Use the 'browse' button to select the 'JkDefragCmd.exe' program.
- Select 'daily', next, select a time, next.
- Enter a userid/password with administrator privileges, click 'Finish'.

Note: The commandline version of JkDefrag ("jkdefragcmd.exe") will exit automatically when finished. See the "-q" option to do the same for the Windows version.

Tip: See the "Settings" of the scheduled task to run only when the computer is idle.

Tip: To start the task minimized, in the settings of the task change the commandline into "start /min JkDefragCmd.exe".

Tip: Use the windows version of JkDefrag ("jkdefrag.exe") to prevent Windows from switching to power-saving while JkDefrag is running.

How to run JkDefrag at boot-time?
It's very easy to run JkDefrag automatically in the background when the computer starts via the Windows Task Scheduler:

- Start -> Control Panel -> Scheduled Tasks -> Add Scheduled Task
- The wizard starts, click 'Next'.
- Use the 'browse' button to select the 'JkDefragCmd.exe' program.
- Select 'When my computer starts', click next.
- Enter a userid/password with administrator privileges, click 'Finish'.

Note: This will not defragment system files such as the page file. To do that see the "see also" chapter for a link to Pagedefrag, a free utility by Microsoft Technet (formerly SysInternals).

How to start minimized, or maximized?
Make a shortcut to the "JkDefrag.exe" program, open the properties of the shortcut, find the "run" setting, and select "minimized" or "maximized". To run the commandline-version in a minimized window use "start /min jkdefragcmd.exe".

How to run with a lower priority?
My advice is to use the JkDefrag "-s" commandline option to slow down the program, but you can change the process priority like this:

```
cmd.exe /c start "JkDefrag" /BelowNormal "jkdefragCmd.exe"
```

How much minimum free disk space does JkDefrag require?
JkDefrag does not require a minimum free disk space, unlike many other defragmenters. But:

- Windows reserves some space for expansion of the MFT, default is 12.5% of the volume size. This space is counted by Windows as free space because it can/will be used for regular files when the rest of the volume is full. JkDefrag cannot move files into this space, only out of ("reclaim MFT reserved space").
- A file can only be defragmented if there is a gap on disk big enough to hold the entire file. There may be plenty of free space, but what is needed is a single big gap. In these cases JkDefrag will try to reduce the number of fragments in the file by using the biggest gaps available.

Why is my disk not perfectly optimized?

- There are many files that cannot be moved while Windows is running, because they are in use by an application, or by a service, or by Windows itself. See the "-d" commandline options and the logfile for more information. They can be anywhere on disk and are usually fragmented into microscopically small segments. In other words, the harddisk is not a big block of space where files can be moved at will, but thousands of little blocks bounded by unmovable data. A typical harddisk can easily contain tens of thousands of files, all with different sizes. What is the optimum way to organize the files into the blocks? The number of permutations is astronomical, it boggles the mind. JkDefrag doesn't even try to calculate them all. It concerns itself with only one block at a time, trying to fit only files from above the block, and limits itself to 0.5 seconds of calculating time. So it's very unlikely, if not impossible, for JkDefrag to perfectly optimize your disk, more's the pity.
- Gaps are only filled with files from above the gap (fast optimization). If there are no files that fit the gap (all files are bigger) then the gap cannot be filled.
- Files can only be fully defragmented if there is a gap large enough to hold the entire file. If no such gap is available then JkDefrag will try to reduce the number of fragments by moving the file to the largest gaps available.
- JkDefrag maintains a "free space" area between the directories and the regular files, and between the regular files and the SpaceHogs. This is by design. See the "-f" commandline option to control the size of these free spaces.

JKDEFRAG FREQUENTLY ASKED QUESTIONS

Why do the sorting optimizations create fragments?
The sorting optimizations will move all the data to the beginning of the harddisk. But there may be some unmovable files in the way. Instead of leaving gaps (if a file doesn't fit between the last file and the unmovable file), the program will "wrap around" the unmovable files by splitting regular files into fragments. This may seem strange for a defragmenter, but the fragments are aligned and the impact on performance is therefore very small. Gaps however would make all the files above the gaps slower, because they would then be placed at a slightly slower part of the harddisk than they need to be. The fragments look terrible on the screen and in the statistics, but are there to make your harddisk faster!

What speed can I expect?
It is impossible to predict how long a defragment/optimize will take. It depends on things such as the optimization you have selected, the speed of your harddisk, how big the files are, how much data is on the disk, and more. Assuming a harddisk speed of 40 megabytes per second, then reading 100 gigabytes of data will take 100000 / 40 = 2500 seconds (42 minutes). But JkDefrag has to do a lot more than just read the data, it also has to write the data, and update the MFT/FAT. And it may have to move data out of the way before it can place an item were it want's it to be. JkDefrag will do things as efficiently as possible, with as little data movement as possible, but it will take a long time nonetheless. If you are concerned about speed then use the default "-a 3" (fast optimize) setting. It will produce very good results in a minimum amount of time, especially if you use it every day.

What are SpaceHogs?
SpaceHogs are less important files that take up a lot of space. JkDefrag moves them behind the directories and the regular files, to make those faster. The internal list of SpaceHogs is (you can add more with the "-u" commandline option):

- Files bigger than 50 megabytes
- Files not accessed in the last month (see next question)
- ?:\$RECYCLE.BIN*
- ?:\RECYCLED*
- ?:\RECYCLER*
- ?:\WINDOWS\$*
- ?:\WINDOWS\Downloaded Installations*
- ?:\WINDOWS\Ehome*
- ?:\WINDOWS\Fonts*
- ?:\WINDOWS\Help*
- ?:\WINDOWS\I386*
- ?:\WINDOWS\IME*
- ?:\WINDOWS\Installer*
- ?:\WINDOWS\ServicePackFiles*
- ?:\WINDOWS\SoftwareDistribution*
- ?:\WINDOWS\Speech*
- ?:\WINDOWS\Symbols*
- ?:\WINDOWS\ie7updates*
- ?:\WINDOWS\system32\dllcache*
- ?:\WINNT\$*
- ?:\WINNT\Downloaded Installations*
- ?:\WINNT\I386*
- ?:\WINNT\Installer*
- ?:\WINNT\ServicePackFiles*
- ?:\WINNT\SoftwareDistribution*
- ?:\WINNT\ie7updates*

- ?:*\Installshield Installation Information*
- ?:\I386*
- ?:\System Volume Information*
- ?:\windows.old*
- *.7z
- *.arj
- *.avi
- *.bak
- *.bup
- *.bz2
- *.cab
- *.chm
- *.dvr-ms
- *.gz
- *.ifo
- *.log
- *.lzh
- *.mp3
- *.msi
- *.old
- *.pdf
- *.rar
- *.rpm
- *.tar
- *.vob
- *.wmv
- *.z
- *.zip

Note: Some virus scanners and other programs that scan all files on disk, will change the last access time of all items on every run, effectively disabling that particular SpaceHogs criterion. The other criteria still apply, though.

What is "NtfsDisableLastAccessUpdate"?
Windows can record the last time a file was accessed on NTFS disks. It makes disks slower because Windows saves the access time on the disk itself, and does this for each and every access. But in combination with JkDefrag it can make your disk faster, because JkDefrag can use the information to optimize your disk, by moving files to the back that have not been used recently. See the "-a 9" optimization and the "What are SpaceHogs" question.

See current setting:	`fsutil behavior query disablelastaccess`
Enable recording of last access time:	`fsutil behavior set disablelastaccess 0`
Disable recording of last access time:	`fsutil behavior set disablelastaccess 1`

Can I run JkDefrag outside Windows?
JkDefrag is based on the Windows defragmentation library, so Windows must be started. JkDefrag can be run from a bootable Windows CD-rom (such as **Bart's Preinstalled Environment (BartPE)** or **Ultimate Boot CD for Windows**), but cannot be run from a DOS bootable floppy or from Linux.

Tip: Boot into Windows safe mode by pressing F8 when booting, and then run JkDefrag. It will be slower (the Windows cache is off in safe mode), but you can defragment more files.

Warning: Do not hybernate your computer, boot with something else (such as BartPE), and then change the hybernated disk in any way. This will corrupt the disk, a known hybernation problem. JkDefrag refuses to process hybernated disks.

Can I run JkDefrag on Windows NT?
No. JkDefrag is based on the Microsoft defragmentation API, and Windows NT does not have that API.

Will JkDefrag reduce the lifespan of my flash memory disk?
Yes, all defragmentation/optimization will reduce the lifespan of flash memory disks (USB memory sticks, Solid State Disks (SSD), and such). Flash memory will get faster if defragmented, but does not gain much from optimization. My advise therefore is to use "-a 2" only, and only incidentally (not every day). JkDefrag does not usually process flash memory disks by default, only if you specify the drive letter on the JkDefrag commandline (for example "jkdefrag h:"), because they are usually seen by Windows as removable volumes.

Can JkDefrag do continuous background defragmenting?
In my opinion continuous background defragmenting and optimization is marketing hype and a bad idea. There is considerable overhead (CPU, memory, disk) that may actually make your computer slower instead of faster, and it will wear out and shorten the life span of your harddisk. I advise defragmenting once a day (via the Windows Task Scheduler) at the most.

What is the "Average end-begin distance"?
When Windows has finished reading a file then the harddisk heads will have to move to the beginning of whatever file is needed next. JkDefrag calculates the average distance from the end of every file to the beginning of every other file, and shows this number in the report (see the logfile). A lower number means that the files are better packed together and can be accessed more quickly.

Note: The lowest possible average distance can be achieved by sorting by filesize.

Can I "hide" the program from users?
See the "How to start minimized, or maximized?" question. Running completely invisible is a bit more difficult. Create a special userid (for example "jkdefrag") with administrator permissions, then add a schedule to the Windows Task Scheduler (see the "How can I run JkDefrag automatically every day?" question) and specify that userid when asked for. The task will then run on that userid and not show anything on the user's screen. But I advise against it, I think it will needlessly worry the user when he sees a lot of mysterious disk activity.

Why is JkDefrag so slow in Windows "safe" mode?
The Windows disk cache is off in "safe" mode, and the "safe" video drivers are very slow.

Tip: minimize the JkDefrag window, or use the commandline version of JkDefrag.

How do I disable the Windows built-in defragger?
Windows 2000 & 2003:
The built-in defragger is not started automatically.

Windows XP:

1. Download the free **Tweak UI** utility from Micorosft.
2. Click on 'General' and untick the 'Optimise hard disk when idle' box.

Windows Vista:

1. Start -> All Programs -> Accessories -> System Tools -> Disk Defragmenter
2. Untick the "Run on a schedule (recommended)" box.

How do I defragment "c:\pagefile.sys"?
One way is to download and install the free **Pagedefrag** utility by Microsoft TechNet (formerly Sysinternals), it will automatically defragment the pagefile and some other system files when the system is booting. But even better is to set the pagefile to a fixed size, so it will never get fragmented again. It's very easy to do:

1. **Windows Vista:** Open the "Control Panel", classic view. Double click "system". Select "Advanced system settings". Click the Performance "Settings" button. Select the "Advanced" tab. Click the Virtual Memory "Change" button.
   Windows 2000: Open the "Control Panel". Double click "system". Select the "advanced" tab. Click the "Performance Settings" button. Click the Virtual Memory "Change" button.
2. Write down the "Currently Allocated" number.
3. **Windows Vista:** Select "no paging file" for all disks.
   Windows 2000: Set the Initial Size and the Maximum Size numbers for all disks to zero.
4. Reboot.
5. Run JkDefrag.
6. Go back to the same panel and setup a pagefile with a "custom size" where both the Initial Size and the Maximum Size are the number you wrote down.
7. Reboot again. The pagefile should now be a single big unfragmented file that will never get fragmented again.

How do I defragment "C:\hiberfil.sys"?
This huge file is used by the hibernation facility and cannot be defragmented on a running system. You can only delete the file, like this:

Windows Vista:

1. Click Start -> All Programs -> Accessories, right click on "Command Prompt", and then click "Run as Administrator". If User Account Control (UAC) asks you for permission, permit the Command Prompt to run.
2. Enter "powercfg -h off" (without the quotes).
3. Reboot. The "hiberfil.sys" file will be automatically deleted.
4. Repeat point 1
5. Enter "powercfg -h on" (without the quotes).
6. Reboot.

Windows XP:

1. Open the Control Panel
2. Double-click Power Options
3. Click the Hibernate tab, de-select the 'Enable hibernate support' check box, and then click Apply.
4. Reboot. The "hiberfil.sys" file will be automatically deleted.

5. Go to the Windows Help & Support Center and search for 'enable hibernation'. It should be the first result. The instructions detail some other steps you may need to follow to reactivate the hibernation.

Why does JkDefrag delete my restore points?
It's not JkDefrag that is deleting your restore points. Restore points use the Shadow Copy service to make snapshots of the disk. JkDefrag does not change files (it only defragments or moves them), but it does change the disk (moving a file is a change to the disk). The Shadow Copy service remembers all these changes in big files in the "C:\System Volume Information\...." folder. When the total amount of diskspace used by shadow copies exceeds a threshold then the oldest snapshot (restore point) is automatically deleted. The threshold can be changed with the "vssadmin" command, see the **vssadmin manpage.**

How do I defragment "C:\System Volume Information\...."?
These huge files are used by the Shadow Copy service, which in turn is used by the System Restore facility and by Windows backup. The files can be defragmented on XP by stopping the Shadow Copy service ("srservice"). They cannot be defragmented on Vista. You can cleanup old shadow copies with "Start -> Programs -> Accessories -> System Tools -> Disk Cleanup", the "More Options" tab. Or you can turn off System Restore altogether like this:

Windows Vista:

1. In Control Panel, click "System".
2. Select "System Protection".
3. If a disk has a checkmark then remove the checkmark.

Windows XP:

1. Open the properties of "My Computer".
2. Select the "System Restore" tab. If you do not see the System Restore tab then you are not logged on to Windows as an Administrator.
3. Check "Turn off System Restore" or "Turn off System Restore on all drives".

How do I defragment "C:\$Extend\$UsnJrnl:$J:$DATA"?
This huge file is used by Windows to track changes in other files and cannot be defragmented. You can delete it by entering the following on the Run commandline (Windows 2003/XP/Vista, not Windows 2000), it can take several minutes to finish:

```
fsutil usn deletejournal /n c:
```

Note: See **fsutil manpage**

Note: The "fsutil" command must be run as administrator. On Vista open a Command Prompt with "Run As Administrator".

How do I defragment unmounted volumes?
Specify the VolumeName on the JkDefrag commandline. For example:

```
jkdefrag \\?\Volume{35683226-d2c4-11dc-9740-806e6f6e6963}\
```

Note: To get a list of all volumes on the computer enter "mountvol" in a command prompt window.

JKDEFRAG FREQUENTLY ASKED QUESTIONS

Why use this defragger instead of the standard Windows defragger?

- Much faster.
- Totally automatic, extremely easy to use.
- Optimized for daily use.
- Disk optimization, several strategies.
- Directories are moved to the beginning of the disk.
- Reclaims MFT reserved space after disk-full.
- Maintains free spaces for temporary files.
- Can defragment very full harddisks.
- Can defragment very large files.
- Can defragment individual directories and files.
- Can be run automatically with the Windows Scheduler.
- Can be used from the commandline.
- Can be used as a screen saver.
- Can be run from cdrom or memory stick.
- Sources available, can be customized.

Why use this defragger instead of a commercial or shareware defragger?

- It's free.
- Totally automatic, extremely easy to use.
- Optimized for daily use.
- Several optimization strategies.
- Directories are moved to the beginning of the disk.
- Reclaims MFT reserved space after disk-full.
- Maintains free spaces for temporary files.
- Can defragment individual directories and files.
- Can be used from the commandline.
- Can be used as a screen saver.
- Can be run from cdrom or memory stick.
- Sources available, guaranteed to be free of spyware, malware, nagware, and such.

Known problems

- Some data on an NTFS partition may become corrupted after you restart a Windows XP-based computer that uses a SATA hard disk drive. This is not a JkDefrag bug but a Microsoft defragmentation API bug. Microsoft have fixed this in XP service pack 3. Also see: **Bugfix 941715**
- Some kinds of external disks cannot be defragmented and optimized, especially network disks that use their own internal operating system and special dedicated filesystem. The drivers of these disks simply do not support it. This is not a JkDefrag bug.
- The "Prefetch\Layout.ini" file is not yet supported. This means that JkDefrag will undo the boot optimization of the built-in XP and Vista defragger.
- Files that are encrypted by Windows can be defragmented and optimized, but their $EFS:$LOGGED_UTILITY_STREAM counterpart cannot. The Windows CreateFile() system call refuses to open these files and I have not yet found a workaround.
- The Microsoft defragmentation API on Vista can defragment and move the MFT, but JkDefrag cannot use this capability yet.
- The Windows defragmentation API refuses to move directories on FAT32 filesystems. This is a known FAT32 limitation and not a bug in JkDefrag.

- The Windows defragmentation API on Windows 2000 does not work on disks that were formatted with a clustersize greater than 4KB. This is a known API limitation and not a bug in JkDefrag. There is no risk of losing data, the API simply refuses to move files.
- A user has reported that his computer freezes when Avira Antivir Professional starts while the JkDefrag screensaver is active.
- A user has sent me a message that HP advises against defragmentation of the special "recovery" partition on their computers. My defragger uses the standard Microsoft defragmentation API, so I think it is safe to use, but I don't know for sure. I have not found any additional information about this issue anywhere on the internet.

JkDefrag makes a special exception for files used by SafeBoot, Acronis OS Selector, SecurStar DriveCrypt, and Symantec GoBack. The files will never be moved. If you know of any other software that needs a special exception then please let me know